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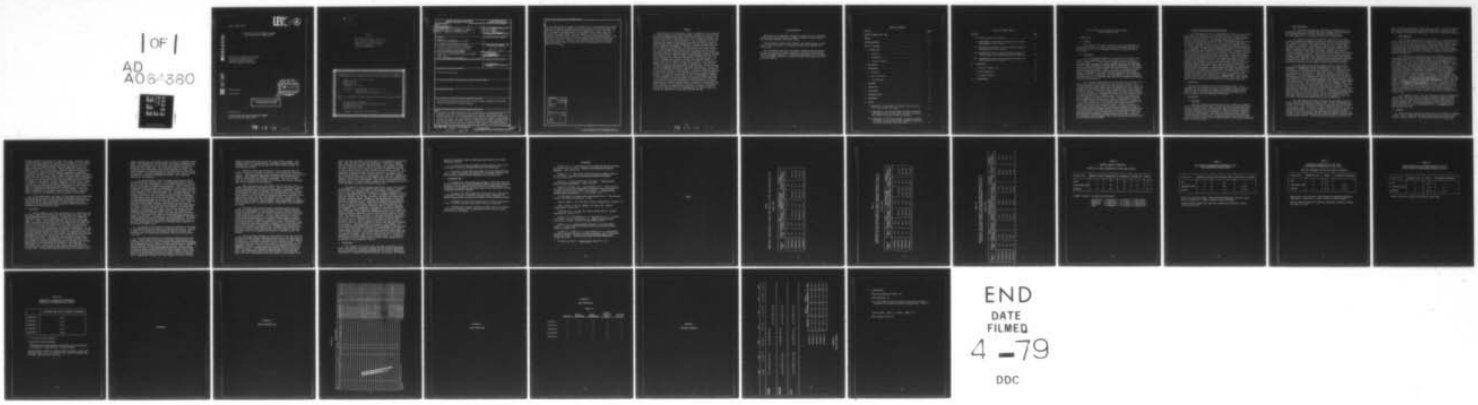

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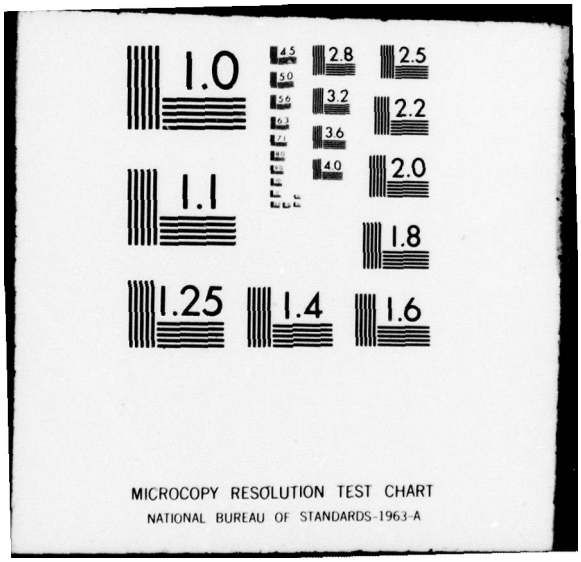
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Report HCSD 78-007

A PILOT STUDY OF THE EFFECT OF DENTAL FACILITY DESIGN ON PRODUCTIVITY

COL Warren A. Parker, DC, US Army
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Fort Sam Houston, Texas 78234

October 1978

Final Report

Prepared for:

UNITED STATES ARMY HEALTH SERVICES COMMAND
Fort Sam Houston, Texas 78234

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The purpose of this study was to test a methodology for determining the dental treatment room (DTR) arrangement and mode of practice which best insures maximum productivity in the Army Dental Care System. The specific objectives of the study were: (a) to determine the most productive dental clinic design presently in use in the Army; and (b) to determine the change in productivity when multiple DTRs are used by a single dentist with varying combinations of dental assistant (DA) and dental hygienist (DH) support. The basic approach

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for this project was to compare the productivity of three general duty dental officers who rotated through three different types of dental facilities and practiced using five different provider combinations for one week each. It was concluded the findings should be considered trends rather than facts because of the small sample size and inability to control scheduling of personnel and facilities to conform to a recognized statistical design. The new modular clinic was shown to be the design in which the rotating teams were most productive. Finally it was concluded that the most productive combinations were those in which the dentist was supported by two primary DTRs and two DAs.

Summary

The purpose of this study was to test a methodology for determining the dental treatment room (DTR) arrangement and mode of practice which best insures maximum productivity in the Army Dental Care System. The specific objectives of the study were: (a) to determine the most productive dental clinic design presently in use in the Army; and (b) to determine the change in productivity when multiple DTRs are used by a single dentist with varying combinations of dental assistant (DA) and dental hygienist (DH) support. The basic approach for this project was to compare the productivity of three general duty dental officers who rotated through three different types of dental facilities and practiced using five different provider combinations for one week each. The clinical results tend to support the participant interview findings which indicate that a dentist using 2 chairs requires more than one dental assistant for effective utilization of the second chair. The clinical findings and interview opinions also mutually support the concept that the new modular design clinics permits a more productive dental practice in a variety of practice situations. The inherent problems of testing under operational conditions were evident in spite of the outstanding cooperation of the study participants. Patient and facility scheduling are greatly affected by factors beyond the control of the project officer or the providers. Because of these uncontrolled variables the statistical test results were not as strong as desired. However, the practical significance of the findings should be helpful to dental managers for use in future facility and staffing decisions. It was concluded the findings should be considered trends rather than facts because of the small sample size and the inability to control scheduling of personnel and facilities to conform to a recognized statistical design. The new modular clinic was shown to be the design in which the rotating teams were most productive. Finally it was concluded that the most productive combinations were those in which the dentist was supported by two primary DTRs and two DAs.

Acknowledgements

This study was accomplished through the efforts of many individuals in Health Care Studies Division, Academy of Health Sciences, US Army and the Dental Activity, Fort Hood, Texas.

The assistance of Major Aaron Schopper, MSC, bears special recognition for his contribution in analyzing the data and reviewing the final report.

The outstanding support and cooperation obtained from COL Charles M. Hare, DC, Director of Dental Activities, Fort Hood, Texas and his staff was greatly appreciated. COL Hare's organization of the clinical rotation schedule resulted in a highly efficient and trouble free data collection effort.

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A PILOT STUDY OF THE EFFECT OF DENTAL FACILITY DESIGN ON PRODUCTIVITY

1. INTRODUCTION.

a. Purpose.

The purpose of this pilot study was to test a methodology for determining the dental treatment room (DTR) arrangement and mode of practice which best insures maximum productivity in the Army Dental Care System.

b. Background.

(1) The methods and modes of the practice of dentistry, both in the civilian environment and in the US Army, are in a state of dramatic change.[1,2,3,4] One of these changes involves the simultaneous treatment of patients in multiple dental operatories by individual dentists. This innovation of using multiple operatories for the simultaneous treatment of several patients has a direct effect on the design and staffing of Army dental clinics. In order to determine the best design and staffing ratios for the future Army Dental Health Care System, a knowledge of the effect of clinic design on the productivity of dental officers is essential. This information is not available at this time nor can it be obtained from Army dental management information presently being reported.

(2) Presently, the majority of the dental care delivered by the Army Dental Corps is rendered in two types of dental clinics: (1) clinics designed in such a manner that each dental operatory consists of an individual room (IOT clinics) and; (2) modular type clinics which are designed in such a manner that several operatories are located within a module (MT clinics). A module is essentially a modified room containing six dental operatories. In addition to these two clinic designs, several temporary World War II vintage clinics are still in operation and will be identified as WWIIs in this study. The Department of Defense (DOD) authorized the construction of dental clinics which contain 2.0 to 2.5 dental chairs per dentist and the Army currently is constructing clinics which provide for 2.0 operatories per general dentist.[5,6] However, the decision concerning the number of chairs per dentist to be included in Army dental clinics was made on an empirical basis.[6,7] The US Army Assistant Surgeon General for Dental Services has expressed a strong interest in obtaining concrete data concerning the effect of dental facilities design on dental officer productivity.[8] This study was requested by the Deputy Commanding General for Dental Services, US Army Health Services Command (HSC) after consultation with the Office of the Surgeon General (OTSG).

c. Previous Studies and Literature Review.

The requirements of AR 5-5 concerning the conduct of a literature review prior to initiation of a study have been met. In addition to numerous sources within the dental literature, the following documents/sources have been utilized: (a) Defense Documentation Center for Scientific and Technical Information (DDC); (b) Defense Logistic Studies Information Exchange (DLSIE); and (c) The Army Study Program (TASP). The current literature contains little information concerning the effect of clinic design and the use of multioperatory offices on the productivity of dentists. In 1948, Klein[3] reported increases of 33 to 75 percent in the dental services rendered by civilian dentists, depending upon the number of dental chairs used with one assistant. The US Navy[9] reported that dental officers operating three chairs with trained technicians increased their productivity by 80 to 100 percent. Both the US Army[10] and the US Public Health Service[11] have reported increases in dentists' productivity associated with the use of multi-chair dental offices. However, these studies, as well as the Navy study,[9] involved the use of expanded function dental auxiliaries who performed many reversible intra-oral dental procedures. Other than the evaluation of dental therapy assistant productivity, no Army studies have been reported concerning the effect on dentists' productivity by increasing the number of operatories utilized by dental officers in IOT or MT clinics. Also, no concrete data exist which compares the effects of these two clinic designs on dental officer productivity. Dental Survey[12] reports that an open clinic design for group practice similar to the Army's modular design clinic has been shown to dramatically increase productivity.

2. OBJECTIVES.

The specific objectives of the study methodology were: (a) to determine the most productive dental clinic design presently in use in the Army; (b) to determine the change in productivity when multiple DTRs are used by an individual dentist with varying combinations of dental assistant (DA) and hygienist (DH) support.

3. METHODOLOGY.

a. Overview.

The basic approach for this project was to compare the productivity of three general duty dental officers who rotated through the three different types of dental facilities and practiced using five different provider combinations for one week each. Dental procedures recorded on the Daily Treatment Worklog (HSC Form 144) served as the data base for productivity measurements. Interviews of participants were conducted on the completion of the study to determine personal opinions and views about the clinic designs and the personnel mixes in the practice situations used for this pilot test.

b. Data Collection.

(1) The Daily Treatment Log, (HSC Form 144 (Appendix A)), was modified to serve as the primary data source document for this project. The originals served as the usual workload instrument for the Fort Hood DENTAC while the duplicates were sent to HCSD weekly.

(2) The data collected in this study consisted of the number of dental treatment procedures, according to specific treatment categories, rendered on a daily basis by the dental officers participating in the survey. In addition, the number of hours per day of dental chair occupancy was recorded. Chair occupancy time for each assigned DTR was used as a measure of hours spent in patient treatment by the various teams. This measure was used as the basis to compare the hours of treatment rendered in each mode rather than dentist hands-on time because it is a more relevant measure of team effort and can be more accurately obtained. This information was recorded directly on the daily treatment log provided for each DTR. Other information recorded included the type of dental clinic (MT, or IOT, or WWII) utilized; the number of dental operatories utilized; and the number of dental assistants utilized.

(3) Each team was led by one dental officer. The following describes the composition of each team employed in the study: (1) Situation 1 - One DTR and one DA; (2) Situation 2 - Two DTR and one DA; (3) Situation 3 - Two DTR and two DA; (4) Situation 4 - Three DTR, two DA, and one DH; (5) Situation 5 - Three DTR, one DA, and one DH (see Appendix B). The DH served as a component team member under the control and supervision of the team dentist. The DH role was not restricted to the traditional role of providing prophylaxis and other preventive procedures with only an indirect semi-independent relationship to other aspects of patient services. The DH were intended to be an integral part of the team and to be utilized to the full extent of their training. They were to function and interact with other team members to provide the most effective and efficient delivery of patient services possible. An adjustment period of five days was allowed prior to Situation 2 to permit the team to adjust to a multiple chair practice. During this adjustment week, data was collected but not analyzed. The data was analyzed for five work days in each of the five situations for each dentist in each type of clinic. The rotation schedule may be seen at Appendix C.

(4) The study monitor, HSC, directed that the sample consist of dental officers stationed at Fort Hood, Texas. These participants were officers with general dentistry MOSs (63A or 63B), who were in the grades of O-3 or O-4. An O-3 must have at least 12 months of service in the US Army Dental Corps. In order to minimize adverse effects on the health care delivery mission of the dental service and to prevent excessive changes in local duty rosters, the individual participants were selected by name by the local DDS using the MOS, grade and length of service guidelines previously stated. DA and DH were also selected by the DDS, Fort

Hood. All were experienced in their respective jobs. In order to obtain participant feedback concerning the study conditions, formal interviews were conducted following the completion of the test by the project officer.

c. Data Analysis.

(1) The data was divided into three groups: (1) the productivity data collected in MT clinics; (2) the productivity data collected in IOT clinics; and (3) the productivity data collected in WWII clinics. Within each of the three groups, the data were further subdivided and analyzed according to the five facility-personnel situations. For each of the major groups (MT, IOT, and WWII), and each of the five facility-personnel subgroups within each major group, descriptive statistics were used to describe productivity.

(2) Separate one-way analyses of variance (ANOVAs) were also performed on the data to evaluate the effects of clinic configuration and team composition. The use of one-way ANOVAs is acknowledged to be improper due to the fact that the same three dentists were employed in all five types of treatment teams and in all three types of clinics. Personnel limitations, real-life scheduling constraints, and the desire to address the specific combinations cited, prohibited the development of a full scale latin-square experimental design which would have permitted a more proper analysis to have been performed. Although unbalanced sequential effects of unknown magnitude may exist, it was decided to accept the results of one-way ANOVAs as reasonable approximations since each combination of dentist and team composition was represented an equal number of times in the analysis of clinic configuration effects, and each number of dentist and type of clinics was represented an equal number of times in the analysis of team composition effects. Nonetheless, due to the lack of independence existing within the analyses and due to the inability to properly address the sequential effects which may exist, the reader is cautioned to interpret the present pilot study findings as being merely suggestive of actual outcome rather than definitive estimators of same.

(3) Computer Service. The data collection forms were keypunched by Production Division, Health Information Systems and Biostatistical Agency, HSC. The System Design and Analysis Branch, CDHCS, provided computer support using the on-line terminal of a CDC 6500 computer at Fort Leavenworth, KN. The preprogrammed Statistical Package for the Social Sciences was used for the data analysis. Programming support was provided from HCSD.

4. FINDINGS.

a. One of the basic measures of productivity is the number of patients treated. Table I describes the daily patient workload for each clinic type by practice situation. The percent difference in average daily

patient workload is also shown for each clinic type. Similarly, Table II shows the mean productivity in numbers of procedures and the percent change in recorded dental procedures by practice mode for each clinic type. Table III compares average dental procedure output for each practice situation by clinic type. Percent differences between the means by clinic type are also shown. Table IV compares the proportion of procedures in each major care category (restorative, diagnostic, preventive, and other). Results of one-way ANOVA and Duncan's Multiple Range tests are also shown. Table V shows the daily average restorative output for each clinic design when practice situations were consolidated. The results of the statistical tests (one-way ANOVA and Duncan's Multiple Range) are also shown. Another comparison of productivity is shown in Table VI. This measure includes a comparison of the average daily total procedures along with the percent differences for each clinic type. Table VII presents consolidated patient workload data for the three types of facilities and the results of the one-way ANOVA. Table VIII shows a comparison of restorative output for each clinical situation and the results of the statistical tests performed on those means.

b. At the completion of the study, the participants were interviewed by HCSD personnel to obtain their subjective opinions concerning the facilities through which they rotated and the practice situations used. These findings will not be presented in tabular format but will be referred to in the discussion section along with observations made by HCSD personnel during the site visits.

5. DISCUSSION.

a. Using the number of patients treated per day as a measure of productivity, slight differences can be observed among the clinic types as each treatment situation is observed. Productivity in the baseline situation (1 DTR, 1 DA) is essentially the same for each clinic type (Table I). When a second dental treatment room was used, the average number of patients treated increased in the modular and individual room clinics 39.75% and 38.37% respectively while there was an increase of only 1.17% in the WWII type clinic. The very small increase in productivity in the latter situation has no practical significance, nor was an explanation for the small increase identified. In Situation 3 (2 DTR, 2 DA) the increases within each type of clinic was impressive while the difference between clinics was less dramatic; the modular clinic averaged approximately one patient per day more than either the WWII or the individual room clinic. Although this increase appears insignificant on a per dentist basis, if extrapolated to a monthly increase by the large number of Army dentists doing this type of practice, the increase would perhaps be a more impressive indicator of care extension. Situations 4 and 5 (3 DTR, 2 DA, 1 DH; 3 DTR, 1 DA, 1 DH) represent the addition of a dental hygienist and a dental treatment area to the practice mode. The increase in productivity shown in the modular clinic

tends to indicate that this design is more feasible for expanded practice modes. The findings also tend to support the clinical impression that dental assistant support is a key factor in multiple chair practice regardless of the clinic type. This is evident from the findings for Situations 3 and 4 which employ two dental assistants per team. The dental hygientist's primary function on the team was to provide preventive services. Directly supporting the dentist in the care of patients appointed for corrective or diagnostic services, was a secondary function for the hygienist.

b. The average number of dental procedures performed per day is another indicator of productivity. It provides more specific information about the type and quantity of care provided than does the use of patient visits only as a productivity indicator. Table II depicts the average daily dental procedure accomplishment by clinic and by practice situation. The modular type clinic procedural output exceeds the other clinic designs in every situation except one. The same output was reported in Situation 5 for the individual room and modular designs. The findings indicate that more procedures per patient were accomplished in the modular clinic than in the other designs. Table II also shows increases among situations was less for the modular clinic because of the high baseline standard set in Situation 1 (1 DTR, 1 DA). Table III shows percent differences between clinic designs for each practice situation. The percent increases were greater when the modular design was compared with the WWII type than when compared to the individual room type. Although the WWII clinic is an open bay design, the older equipment and arrangement of equipment make it less accessible than individual adjacent treatment rooms. The means described in Tables I, II, and III were tested for statistical significance even though the sample size was small. The results of the one-way ANOVA and the Duncan's Multiple Range tests were inconsistent and inconsequential. Therefore, the findings were converted to percent differences and tend to be of practical significance in support of the modular design, regardless of the provider situation used.

c. An analysis of the procedural output was performed to determine if the types of practice in each of the clinics were similar. As shown in Table IV the proportion of procedures in each of the major care categories were not significantly different when ANOVA was performed ($p \leq .05$).

d. Two additional approaches to measuring productivity were performed. Overall means for situations (personnel configuration) were calculated for each clinic type and percent differences were determined. The consolidated output of dental procedures was greatest in the modular clinic design for restorative and total procedures. Table V and VI provide the basis for the acknowledgement that when the three groups of dental personnel rotated through the modular design clinics, their productivity was greater than when they treated patients in the other types of facilities used in this pilot project. Table VII indicates that no significant difference was found between the overall average

number of patients seen per day for the three facility designs. This finding leads to the conclusion that the modular design permits more treatment to be rendered per patient visit than the older designs for the situations tested.

e. Table VIII shows that the dentist is more productive when two dental assistants are assigned in multiple chair situations, (Situations 3 and 4). The restorative procedures represent combined data from the three clinics. This finding is supported by the subjective impressions provided by the dentists and the dental assistants. They felt strongly that for the multiple chair concept to be effective each dental treatment chair must be supported by an assistant.

f. When participants were interviewed, they all expressed their enjoyment with working in the modular design. Some of the reasons expressed for this preference were the type and arrangement of equipment; better communications with other team members and the appointment desk personnel, which resulted in less time away from the treatment area to appoint and locate patients; and the central pre-packaged instrument trays which saved time before, during, and after the treatment period. In general, the modular clinic was seen by the participants as a more pleasant and efficient facility in which to treat patients. These impressions are supported by the observations of the project officers during site visits throughout the study.

g. This pilot study effort received outstanding support from the Director of Dental Services, Clinic Chiefs, and all involved personnel of the Fort Hood DENTAC. It was noted by the project officers that dedicating a portion of a clinic to a specific mission affects the activities of the entire clinical facility. It may be more realistic to involve entire treatment facilities in such special missions whenever possible in any future similar endeavors. Regardless of the emphasis placed on the dental activity to reduce uncontrolled variables, the mission of the units comprising the patient workload continues to be an important factor in this type of study. During weeks of unscheduled military training there were unusually high failure rates. Although every possible effort was made to replace failed patients with sick call patients, time was lost which could not be regained--particularly a problem in short term studies.

h. In the two-chair situation it was observed on-site that one chair becomes the primary dentist treatment chair and the second chair tends to be supportive. For example, the primary chair accounts for approximately 55 percent more restorative procedures than the secondary chair. In the three-chair mode the third chair was virtually used exclusively for the hygienist's patients. In this pilot effort the hygienist performed in a traditional role of providing preventive services but with closer proximity to a dentist. The hygienists indicated that they did not feel a close team relationship but did feel more involved. They indicated that, with time, they probably would have become a closer partner in the

dental care team and better utilized except in the individual room environment. They felt that the physical separation of individual treatment rooms precluded any realistic team involvement. The dentists indicated that they liked the concept of having the hygienist available for more efficient referral but were unsure of how best to utilize the hygienist in this situation except to refer patients for preventive services. The hygienists indicated that they received essentially no support from the team dental assistants. Their reaction was that a team would require more training and would have to work together as a unit for a considerable length of time before effective interchange could take place between the hygienist and the other team members. The concept of providing more direct hygienist support to dental officers appears to be acceptable but will require additional training for effective utilization.

i. The measure of chair occupancy time did not prove to be as useful as anticipated. As the individual worksheets were reviewed, it became obvious that chair occupancy time is a poor measure of productivity. That is, long appointments may not appear as a highly productive visit in terms of reportable procedures. The type of treatment rendered is a more important variable than is chair occupancy time under the present dental procedure reporting system. However, it was observed that in multiple operatory situations the chair occupancy was approximately the same for each of the available chairs. There were 23 minutes average difference in chair occupancy time between chairs when one dental assistant was available compared to 21 minutes difference when two dental assistants were assigned. This finding was in contrast to the opinions offered by the dentists and dental assistants regarding the effect of the number of dental assistants on the equal use of multiple dental chairs. When chair occupancy time was compared for the one and two dental assistant situations, the finding tends to support the responses solicited from participants. That is, in situations 2 and 5 (one dental assistant supporting two chairs used by a dentist) only an 8% increase in time of chair occupancy occurred. When two dental assistants were used (Situations 3 and 4) the chair occupancy increased to 41% over the baseline as reported in Situation 1. When interviewed, and unaware of this finding, the dental assistants unanimously stated that the assignment of one assistant to two dental chairs was not efficient, but that an effective "rover" concept would be feasible. They hesitatingly indicated that perhaps one "rover" dental assistant could support two teams of two chairs each with one assigned assistant. This would in effect constitute a 1.5 dental assistant to two dental chairs (or one dentist) ratio. To validate the effectiveness of this proposed ratio, an entire clinic should be used as opposed to using sections of clinics.

6. CONCLUSIONS.

a. The findings of this pilot study are based on relatively small sample sizes and the statistical analyses were not entirely appropriate due to an inability to schedule personnel and facilities as required to conform with a recognized statistical design. As a result, the findings

should be considered trends, rather than proven facts, with strong statistical backing.

b. In this pilot study the modular clinic design was shown to be the design in which the rotating teams were most productive.

c. The practice modes which were shown to be most productive were those in which the dentist was supported by two dental assistants and had two dental treatment areas available for his primary use.

7. RECOMMENDATIONS.

a. Recommend that the methodology employed in this pilot study be modified in any future studies conducted by HCSD to determine the effect of dental facility design or mode of practice on dental productivity. Scheduling of personnel and facilities must be more controlled to permit recognized statistical analyses.

b. Recommend that where sufficient facilities exist, dentists be encouraged to practice in multiple operatory modes, especially in modular design dental facilities with adequate dental assistant support.

c. Recommend that the current DA policy for a dental construction ratio of two DTR per general duty dental officer be continued.

d. Recommend that a dental assistant staffing ratio of one dental assistant per operating DTR for general duty dental officers using multiple DTR be considered.

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TABLES

TABLE I

COMPARISON OF MEAN NUMBER OF PATIENTS SEEN PER DAY BY CLINIC TYPE AND PRACTICE MODE

CLINIC TYPE

PRACTICE MODE		WWII		INDIVIDUAL ROOM		MODULAR	
	NUMBER OF DAYS	NUMBER OF PATIENTS	PERCENT DIFFERENCE	NUMBER OF PATIENTS	PERCENT DIFFERENCE	NUMBER OF PATIENTS	PERCENT DIFFERENCE
SITUATION 1	15	8.5	-	8.6	-	8.3	-
SITUATION 2	15	8.6	(+1.17)	11.9	(+38.37)	11.6	(+39.75)
SITUATION 3	15	12.9	(+51.76)	12.7	(+47.67)	13.7	(+65.06)
SITUATION 4	15	20.3	(+138.83)	18.9	(+119.76)	22.2	(+167.46)
SITUATION 5	15	15.6	(+83.52)	16.6	(+93.02)	18.9	(+127.71)

TABLE II

COMPARISON OF THE AVERAGE NUMBER OF DENTAL PROCEDURES PERFORMED PER DAY BY CLINIC TYPE AND MODE OF PRACTICE AND PERCENT DIFFERENCE BY MODE OF PRACTICE

CLINIC TYPE

PRACTICE MODE	NUMBER OF DAYS	WWII		INDIVIDUAL ROOM		MODULAR	
		NUMBER OF PROCEDURES	PERCENT DIFFERENCE	NUMBER OF PROCEDURES	PERCENT DIFFERENCE	NUMBER OF PROCEDURES	PERCENT DIFFERENCE
SITUATION 1	15	38.3		46.4		55.1	
SITUATION 2	15	45.0	(+17.49)	52.1	(+12.28)	62.8	(+13.97)
SITUATION 3	15	58.4	(+52.48)	72.0	(+55.17)	78.7	(+42.83)
SITUATION 4	15	89.4	(+133.28)	110.1	(+137.28)	144.9	(+162.97)
SITUATION 5	15	79.3	(+107.04)	107.5	(+131.68)	107.5	(+95.09)

TABLE III

COMPARISON OF THE AVERAGE NUMBER OF DENTAL PROCEDURES PERFORMED PER DAY BY CLINIC TYPE AND MODE OF PRACTICE AND PERCENT DIFFERENCE BY CLINIC TYPE

CLINIC TYPE

PRACTICE MODE	NUMBER OF DAYS	WWII		INDIVIDUAL ROOM		MODULAR		PERCENT DIFFERENCE IND RM TO MOD
		NUMBER OF PROCEDURES	PERCENT DIFFERENCE	NUMBER OF PROCEDURES	PERCENT DIFFERENCE WWII TO IND RM	NUMBER OF PROCEDURES	PERCENT DIFFERENCE WWII TO MOD	
SITUATION 1	15	38.3	-	46.4	21.14	55.1	43.86	18.75
SITUATION 2	15	45.0	-	52.1	15.77	62.8	39.55	20.53
SITUATION 3	15	58.4	-	72.0	23.28	78.7	34.76	9.30
SITUATION 4	15	89.4	-	110.1	23.14	144.9	62.08	31.60
SITUATION 5	15	79.3	-	107.5	35.56	107.5	35.56	-

TABLE IV

PRACTICE ANALYSIS COMPARISON

PROPORTION OF TOTAL PROCEDURES BY MAJOR CARE CATEGORY

CLINIC TYPE	NUMBER OF DAYS	RESTORATIVE*	DIAGNOSTIC*	PREVENTIVE*	OTHER
WWII	75	.67	.06	.21	.06
INDIVIDUAL ROOM	75	.68	.06	.22	.04
MODULAR	75	.64	.07	.24	.04

*ANOVA Performed: No significant difference

Restorative: F Probability = .26 (F Ratio = 1.3178(2/224)).
Diagnostic: F Probability = .10 (F Ratio = 2.2540(2/224)).
Preventive: F Probability = .25 (F Ratio = 1.3767(2/224)).
Other: F Probability = .10 (F Ratio = 2.2594(2/224)).

TABLE V

MEAN NUMBER OF RESTORATIVE PROCEDURES PER DAY
WITH CONSOLIDATED PRACTICE MODES

CLINIC TYPE	NUMBER OF DAYS	DAILY PROCEDURE MEAN*	PERCENTAGE DIFFERENCE
WWII	75	38.6	-
INDIVIDUAL ROOM	75	48.4	+25.38
MODULAR	75	52.9	+37.04

*Significant Tests Performed: ANOVA indicated significant difference among means, F probability = .0000, (F Ratio = 22.4178 (2/224)).

Duncan's Multiple Range Test indicated a significant difference between each mean ($p < .05$).

TABLE VI

PRODUCTIVITY SUMMATION BY CLINIC TYPE
FOR COMBINED CONFIGURATIONS IN THIS STUDY

MEAN RAW PROCEDURES PER DAY AND PERCENT DIFFERENCES

CLINIC TYPE	NUMBER OF DAYS	MEAN*	PERCENTAGE DIFFERENCE
WWII	75	62.0	-
INDIVIDUAL ROOM	75	77.6	+25.16
MODULAR	75	89.8	+44.83

*Significance Tests Performed: ANOVA indicated significant difference among means. Probability = .0000, (F Ratio = 11.4559 (2/224)).

Duncan's Multiple Range Test indicated significant difference between each mean ($p < .05$).

TABLE VII

AVERAGE OVERALL DAILY PATIENT WORKLOAD BY TYPE OF CLINIC DESIGN WITH CONSOLIDATED PRACTICE MODE DATA

CLINIC TYPE	NUMBER OF DAYS	MEAN*	PERCENTAGE DIFFERENCE
WWII	75	(13.2)	-
INDIVIDUAL ROOM	75	(13.8)	+4.5
MODULAR	75	(14.9)	+12.9

*ANOVA indicates no significant difference among means

TABLE VIII

COMPARISON OF RESTORATIVE PROCEDURES BY
SITUATION WITH CONSOLIDATION OF CLINICS

	UNWEIGHTED MEAN DAILY RESTORATIVE PROCEDURES
SITUATION 1	36.84
SITUATION 2	40.13
SITUATION 3	54.31
SITUATION 4	55.26
SITUATION 5	46.80

N = 45 days for each situation.

*Significance Tests Performed:

ANOVA indicated that significant differences exist among means F Probability = .0000 (F Ratio = 18.9548 (2/224)).

Duncans Multiple Range Test indicated that situations 3 and 4 were different from 1, 2, or 5 but that 3 and 4 were not significantly different from each other ($p < .05$).

APPENDICES

APPENDIX A

DENTAL TREATMENT LOG

APPENDIX A

DENTAL TREATMENT LOG

DOCTOR: | DATE: | ASSISTANT:

[illegible]	NAME	GRADE	CAT	TREATMENT CODE NUMBER

TIME LOST DUE TO UNFILLED APPOINTMENTS: ____________

[illegible] Form 144 (DDC)
1 Dec 75

DENTAL PROCEDURES	ARMY A	NAVY MARINE B	AIR FORCE C	[illegible] D	ALL OTHER E
A. OPERATIVE AND CROWN AND BRIDGE					
1. AMALGAM (One surface)					
2. AMALGAM [illegible]					
3. BASE INTERMEDIATE					
4. RESIN					
5. ROOT CANAL FILLING (Teeth)					
6. SILICATE					
7. TEMPORARY OR SEDATIVE [illegible]					
8. [illegible]					
9. GOLD (Inlay, foil)					
10. [illegible]					
11. GOLD CROWN (All types)					
12. RESIN CROWNS					
13. RESIN CROWN WITH METAL					
14. OTHER CROWNS					
15. CROWN OR BRIDGE REPAIR					
16. [illegible]					
B. PROSTHODONTICS					
17. DENTURE, RECONST., RELINE, REPAIR					
18. FULL DENTURE					
19. PARTIAL DENTURE					
20. OTHER MAXILLOFACIAL APPLIANCES					
21. ORTHODONTIC APPLIANCES					
C. ORAL SURGERY					
22. ABSCESS, INCISION AND DRAINAGE					
23. ALVEOLECTOMY					
24. APICOECTOMY					
25. BIOPSY					
26. CYSTECTOMY					
27. FRACTURE MANDIBLE REDUCTION					
26. FRACTURE MAXILLA REDUCTION					
29. FRACTURE (Other) REDUCTION					
30. ROOT RESIDUAL REMOVAL					
31. TOOTH REMOVAL					
32. TUMORS [illegible] EXCISION					
33. [illegible]					
D. [illegible]					
36. [illegible]					
38. [illegible]					
39. [illegible] TREATMENT					
40. PROPHYLAXIS					
41. SCALING (Periodontal)					
42. CARIES PREVENTION TREATMENT					
43. PREVENTIVE DENTISTRY COUNSELING					
E. RADIODONTICS					
44. INTRA ORAL ROENTGENOGRAM					
45. EXTRA ORAL ROENTGENOGRAM					
F. OTHER					
46. EXAMINATIONS (Type 1, 2 and 3)					
47. ORTHODONTIC TREATMENT					
48. POST OPERATIVE TREATMENT					
49. PERIO SCREENING EXAM					
51. TOTAL PROCEDURES, LINES 1-49					
52. TOTAL PATIENTS TREATED					

U.S. GOVERNMENT PRINTING OFFICE: 197[illegible]

APPENDIX B

TEAM COMPOSITION

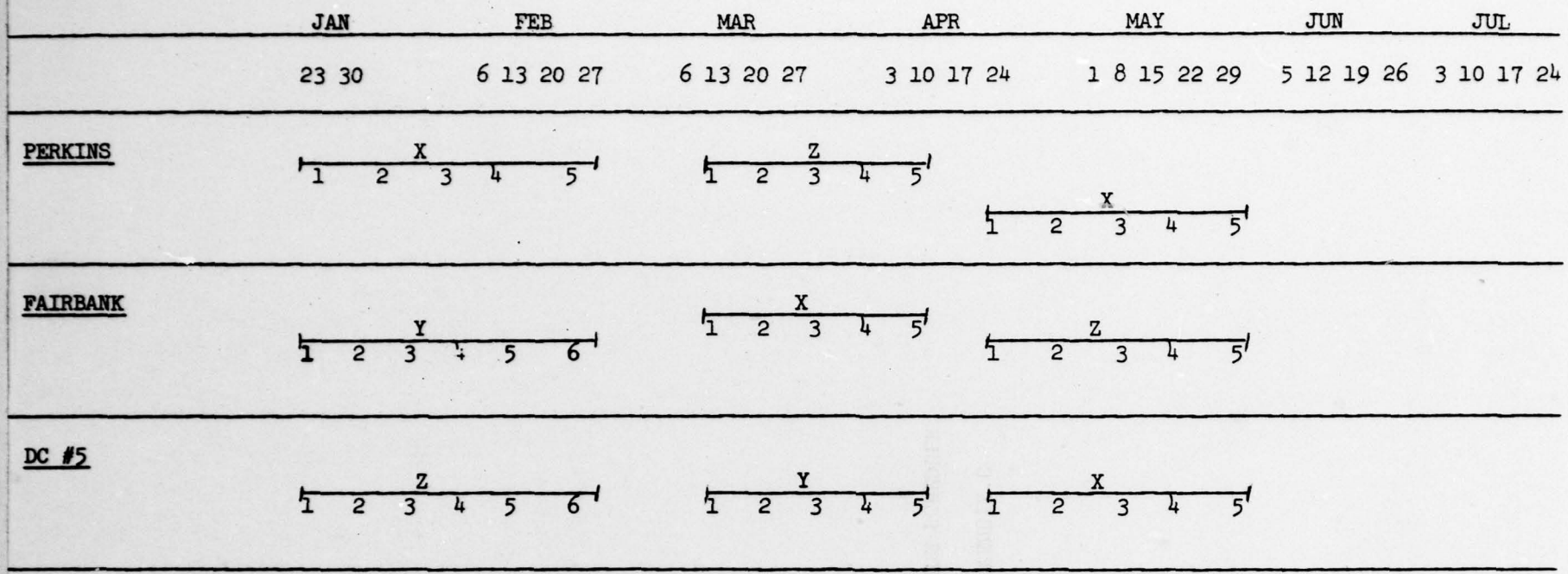
APPENDIX B

TEAM COMPOSITION

	Number of Dentists	Dental Assistants	Dental Hygienists	Dental Treatment Rooms	Work-Days of Data
Situation 1	1	1	0	1	5
Situation 2	1	1	0	2	5
Situation 3	1	2	0	2	5
Situation 4	1	2	1	3	5
Situation 5	1	1	1	3	5

APPENDIX C

ROTATION SCHEDULE



	Dentists	Dental Assistants	Dental Hygienists	DTR
Situation 1	1	1	0	1
Situation 2	1	1	0	2
Situation 3	1	2	0	2
Situation 4	1	2	1	3
Situation 5	1	1	1	3

APPENDIX C

ROTATION SCHEDULE

11. DISTRIBUTION:

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HQDA (DASG-DCA) (1)

Dir, Joint Medical Library, Offices of The Surgeon General,
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